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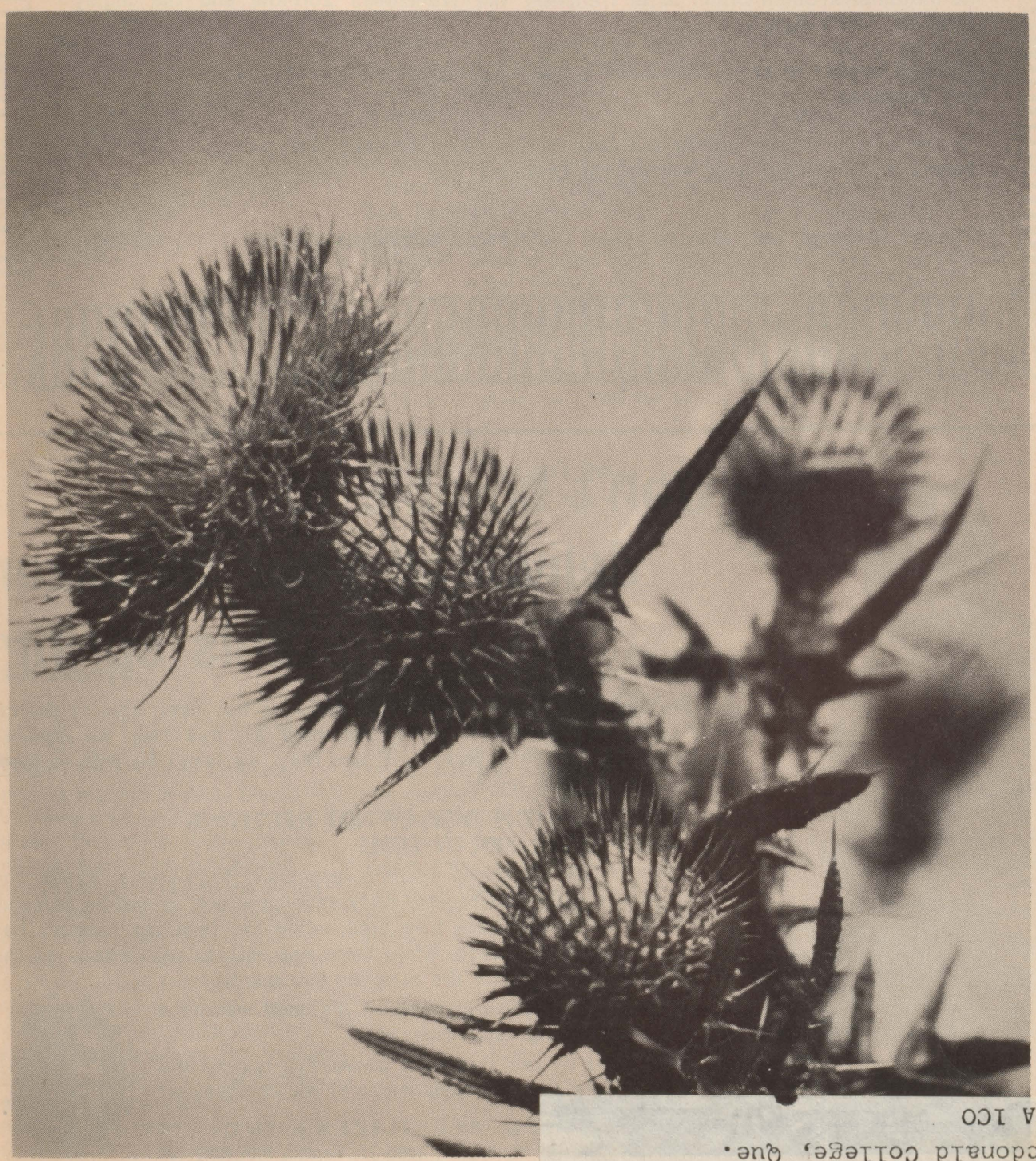
# THE macdonald JOURNAL

MARCH 1977



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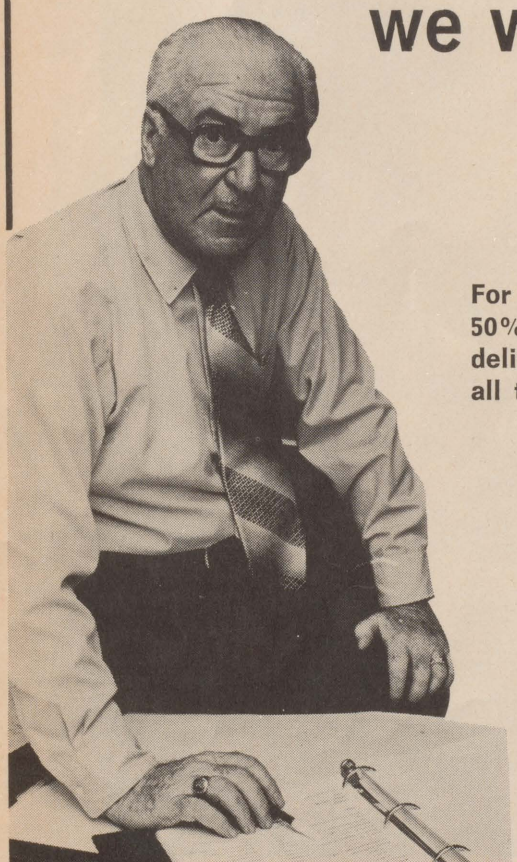

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**In This Issue**

Cover: The bull thistle is not native to Canada, neither is the insect that is being used to control it. See article page 3.



## urnal Jottings

ne of my favourite black and hite photographs is a close-up a pair of work-worn hands pping a mound of rich, black il. Farmers know the value of eir soil, that much of life begins ere, and they, too, in a month so will be going out to the fields, ooping up a handful of earth, bbing it between thumb and refinger and letting it sift slowly ck to the ground. Modern farm anagement and machinery may ve increased the soil's ability yield more; however, the proper e of these machines and better anagement practices could crease yields even more and, erefore, profits. The article on il Compaction in this issue oves the point.

Think back to the number of times you drove the tractor over a field last spring; how often did you go over the same area? Do you remember the tractor slipping and the back wheels spinning? Why not read the article on soil compaction before heading out to the fields this year. As Professor McKyes points out: "Be very careful of the soil, and it will be good to you."

Weeds are yet another reason for reduced yields. Last year Joan Habel wrote a brief Macdonald Report on Professor Watson's research in the biological control of weeds. Farmers in Quebec were asked to assist him and their response was gratifying. His research continues as does his need for farmers' co-operation as you will find out when you read his interesting article.

Hazel M. Clarke

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# Editorial

The corporate and industrial sector of this country has already devoted considerable time and expertise to evaluate how the tax laws relate to their business operations. Specialized resources were meticulously mobilized to unravel the complex tax legislation and segregate the sections which seemed, in the opinion of the business world, to penalize unnecessarily its revenues from those sections that provided beneficial loopholes that could be exploited legally.

During such an exercise, the industry obviously had at its disposal a large pool of resources from which it could make its selection to exploit all the tax possibilities in their favour. The farm producer, on the other hand, rarely can identify with the luxury of a single competent resource. In many cases it is difficult for a farmer to find the professional support of a chartered accountant within his community that not only understands and appreciates an agricultural enterprise but also has the necessary expertise to apply the Tax Act so that the farmer can enjoy advantages offered by it.

Why is there such an obvious lack of tax expertise in agriculture? Perhaps it can be traced to the distorted image which the farmer and professionals, specifically chartered accountants, appear to project towards each other. How often does it happen that a farmer because of his prejudiced mistrust or unavailable professional assistance in the financial domain will avoid seeking further professional advice until his situation becomes so desperate that such assistance is his last resort. The professionals, on the other hand, fail to grasp the realization that today's farming is a business. Although the number of farmers has dwindled significantly in Quebec from approximately 80,000 in 1966 to around 45,000 in 1976, their net income has, over the same period, shown an increase from $210,625,000 to an estimated $412,784,000 for 1976. By discounting the importance of this interesting and unexplored market, the professional advisers have left a void in an area that is in dire need of such assistance.

In order for the agricultural industry and the farmer to continue to achieve sound economic growth, the farmer will have to extend himself to get reliable economic advice. This could be instrumental in solving the most serious problem facing the agricultural industry today, which is the transfer of the farm within the family. It cannot be denied that only professional assistance can enable a family to develop an individualized transfer of property that would make provisions for sound financial security for all parties concerned.

The complexities which are prevalent in the tax and inheritance laws can baffle the mind of the average citizen. Why not start thinking about it now, then start searching for an adviser. It might take longer than you anticipate to find him.

Martin van Lierop


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# Biological Control of Weeds

**y Professor Alan Watson**
**epartment of Plant Science**

**troduction**

iological control of weeds is the eliberate use of natural enemies o reduce the density of a particular eed to a tolerable level. The bjective of biological weed ontrol is not eradication but mply the reduction of the weed opulation to an economically low vel. In fact for biological control be continuously successful, mall numbers of the weed host ust always be present to assure e survival of the natural enemy.

ne two most frequently cited xamples of successful biological eed control are the destruction the prickly pear cacti (*Opuntia* p.) in Australia by an imported oth *(Cactoblastis cactorum)* and e control of St. Johnswort *(Hyericum perforatum)* (millepertius erforé) on rangeland in California, regon, Washington, and British olumbia. These examples deonstrate that biological control an provide a permanent solution serious weed problems. The rst insects were introduced 50 ears ago and the Australian ickly pear is still under control. . Johnswort is presently conolled at two per cent of its former ensity in British Columbia.

eeds are "plants growing where ey are not wanted" and most of ir serious weeds have been troduced from other parts of e world. Of the 107 noxious anadian weeds, 78 have been troduced from Europe or Asia. ne of the reasons why these ants are so noxious in their new bitat is that their natural enemies e often absent. Biological control s most frequently been applied ainst these alien weeds and tempts are made to restore the tural control of these weed sts by introducing one or more st-specific, damaging natural emies from the native region the weed.

**Methods Used in Biocontrol of Weeds**

The classical or conventional approach to biological control of weeds involves the introduction of host-specific natural enemies of alien weeds. Recently the approaches utilized in biocontrol programs have been expanded to include two other methods:

1. augmentation of natural enemy populations;
2. application of "biological herbicides".

Augmentation includes the periodic release and/or distribution of natural enemies. Work is presently being conducted in the United States to determine the effect of mass rearing of a native moth *(Bactra verutana)* in the laboratory and releasing it in fields of yellow nutsedge *(Cyperus esculentus)* (souchet comestible). The application of spore suspensions of plant pathogens as 'biological herbicides' is discussed in more detail later.

**Biological Control Agents**

Insects have been most frequently used as biological control agents of weeds and this will likely continue. The reasons are that there have been major successes using phytophagous insects and almost all of the scientists working in biocontrol of weeds are entomologists. However, recent research has demonstrated the potential of other organisms, including plant pathogens, nematodes, and fish.

**Procedures in Classical Biological Control**

The first step in a biological weed control program is to determine the suitability of the weed for this approach. Not all weeds are suitable and those with the following characteristics are generally least suited for biological control:

1. Weed species which are valued in other situations are not good candidates for this approach. For example, blue weed *(Echium vulgare)* (vipérine) is a serious pasture weed, but it is also a desirable honey plant. As the biocontrol agent cannot be limited in area, like chemical or mechanical treatments, 'weeds' that are of values in other situations are not suitable targets for biocontrol.

2. Weeds that are closely related to economic crops are not good candidates for this method. The closer the relationship the less possibility there is that a biotic agent could distinguish between the weed and the crop. For example, no insects have been found that attack wild oats *(Avena fatua)* (folle avoine) and do not attack cultivated oats and our other cereals.

3. Native weed species are not generally amenable to this approach. However, the native range of an introduced (alien) weed provides a source from which a parasite can be introduced.

4. Weeds of cropland under intensive cultivation are generally not suited to this approach. Since the biological control agent is specific to only one weed species, little would be gained if one weed, such as lambsquarters, was controlled in the corn crop as numerous other weed species would soon occupy the available space. However, biocontrol is particularity suited to rangeland situations where a single, dominate weed species is troublesome.

5. Minor weed problems are not generally suited to this approach. The target weed should infest large areas. Since there are only four scientists in Canada working more or less full time in biological weed control, minor weeds usually cannot be considered.

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6. If eradication of the weed is desired (e.g., poisonous weeds), the method is generally not applicable.

Therefore, in classical biocontrol of weeds, the ideal target weed is an aggressive, introduced weed which infests large areas of marginal land such as rangeland, pastures, and waste areas.

The second step in the program is to conduct a survey overseas to determine if there are any parasites available for introduction against the weed. A survey is also conducted in Canada to ensure that a prospective biotic agent is not already present in Canada and to determine what parts of the target weed are not attacked in Canadian populations. For example, Canada thistle (*Cirsium arvense*) (chardon des champs) is attacked by a number of seed feeders in Canada and, therefore, it would be of little value to introduce other organisms that attack the seed heads. Surveys are being conducted in Europe on the following weeds:

Spurge hawkmoth larva feeding on leafy spurge.

| English Name | French Name | Scientific Name |
|---|---|---|
| bindweed | liseron | *Convolvulus* spp. |
| absinthe | armoire | *Artemisia absinthium* |
| narrow-leaved hawk's beard | crépis des toits | *Crepis tectorum* |
| white cockle | lychnide blanche | *Lynchis alba* |
| bladder campion | silene enflée | *Silene cucubalus* |
| European buckthorn | nerprun commun | *Rhamnus cathartica* |

The third step is to determine the potential effectiveness of the parasite in Canada in an attempt to eliminate ineffective agents before importation and screening tests in Canada. Insects that have been collected in certain parts of Europe may not survive under Canadian conditions.

The next and perhaps most important phase of the program is to determine the safety of the selected parasite for release in Canada. The introduced agent must not attack or damage any desirable plants in Canada. Very extensive tests are conducted in the quarantine facilities at the Agriculture Canada Research Station at Regina, Saskatchewan. These studies involve thorough investigations of the agent's biology and its host range to demonstrate that the introduced agent is host-specific and will not become a pest of an economic crop. Some insects that are presently being screened at the Regina laboratory include:

*Liothrips* spp. — a sucking insect which attacks ragweed (*Ambrosia artemisiifolia*) (petite herbe à poux).
*Tephritis dilacerata* — a seed-head fly attacking perennial sowthistle (*Sonchus arvensis*) (laiteron des champs).
*Argyroploce striana* — a root moth attacking dandelion (*Taraxacum officinale*) (pissenlit).

If it is found during these tests that the candidate biological control agent is not host-specific, the organism is destroyed and the project is terminated.

After the screening tests are complete, a report is prepared for joint approval by the Canadian and U.S. governments. A report on the nematode, *Paranguina picridis*, which forms galls on Russian knapweed [*Acroptilon* (*Centaurea*) *repens*] (centaurée de Russie), was recently submitted and permission for limited field trials has been granted.

Once the agent has been determined safe and permission to release it has been given, the fifth step in the program is to establish the biocontrol agent in Canada on infestations of the target weed. This part of the program requires the co-operation of farmers. Infestations of the target

veed need to be located and the elease site must be maintained for some time with minimal disturbance. This stage is the most critical in the program as many agents have failed to become established because they were not adequately cared for during the initial phases of establishment in their new environment. Attempts are being made to establish insect agents on the following weeds in Canada:

| | |
|---|---|
| Nodding thistle (chardon penché) *(Carduus nutans)* | — *Rhinocyllus conicus* (seed-head beetle) |
| | — *Ceutorhynchidis horridis* (root weevil) |
| Canada thistle (chardon des champs) (Cirsium arvense) | — *Urophora cardui* (stem gall fly) |
| Bull thistle (chardon vulgaire) *(Cirsium arvense)* | — *Urophora stylata* (seed-head fly) |
| Russian thistle (soude roulante) *(Salsola pestifer)* | — *Coleophora parthenica* (stem mining moth) |
| Diffuse and Spotted knapweed centaurée diffuse et centaurée maculée) *(Centaurea diffusa, C. maculosa)* | — *Urophora affinis* and *U. quadrifasciata* (seed-head flies) |

Once the insect agent is established, the sixth step is to determine if the agent is increasing and its effect on the weed. The beetle on nodding thistle and the seed-head flies on the knapweeds are well established and are rapidly increasing.

Two major projects can be considered complete in Canada. As mentioned earlier the population of St. Johnswort in British Columbia has been reduced to two per cent of its former density by two leaf-feeding *Chrysolina* beetles. Tansy ragwort *(Senecio jacobaea)* séneçon jacobée) has been successfully controlled in Nova Scotia by the defoliating cinnabar moth (*Tyria jacobaeae*).

From the above examples it can be seen that biological weed control programs have been primarily concerned with introduced insects as biotic agents and the approach has been directed against aggressive, alien weeds in rangeland situations. However, recent research results with other types of biocontrol agents, particularly plant pathogens, has extended the application of biological control to aquatic weeds and those of cultivated land.

**Plant Pathogens As Biocontrol Agents of Weeds**

Plant pathogens offer two advantages over insects as biocontrol agents of weeds: 1) they are often more host specific, and 2) they can be applied with conventional spray equipment at a time when the weed is at its most susceptible stage.

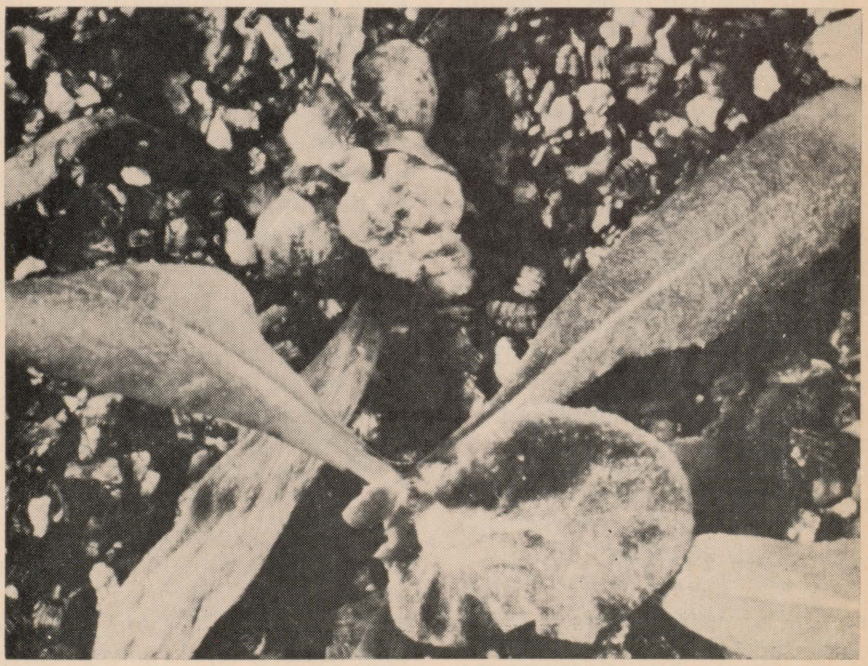
A. Conventional approach

As discussed above, biological control of weeds has conventionally been applied against alien weeds by introducing one or more of their natural enemies. Control of a weed with a plant pathogen used in this manner was achieved against skeleton weed *(Chondrilla juncea)*, the major weed of wheat in Australia. A host-specific rust, *Puccinia chondrillina*, was collected in Italy and introduced into Australia in 1971. The rust spread very rapidly and at present controls the weed over most of its range. Control has been so spectacular that herbicides are no longer being used to control this weed in Australia.

Numerous introduced weeds in Canada are known to be attacked by plant pathogens in their native ranges. However, research in this area has not yet been established in Canada.

B. Biological Herbicides

A new approach to biocontrol of weeds has recently been pioneered in Arkansas with the application of a spore suspension of an endemic fungus. The fungus controlled 99 per cent of a serious weed (Northern jointvetch) in rice,



Leaf and stem galls on Russian knapweed caused by a nematode.

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without damage to the rice crop. The disease was already present in the fields but did not damage its host because it normally attacked too late in the season. However, when the fungus was applied early (in the seedling stage), it destroyed the weed. The fungus is now being tested on a field scale and there appears to be no biological or technological limitations that would prevent commercialization of the fungus as a 'mycoherbicide'.

Possible targets for this approach in Canada are numerous as practically all Canadian weeds have plant pathogens recorded on them. For example, wild oats (*Avena fatua*) (folle avoine) and other weeds of our cultivated land can be controlled to some extent by cultural and mechanical means. However, they still remain as serious contaminants of our crops. Wild oats is attacked by numerous plant pathogens which normally attack late in the season and do not appreciably damage the weed. If host-specific pathogens of wild oats were applied early in the season, some degree of control could possibly be achieved.

An attractive feature of this method is that it does not involve the introduction of any new organism into our environment but merely the use of host-specific pathogens at a time when they are most effective. This method may also prove to be valuable for integrated weed control systems. For example, most weeds are controlled in corn with standard herbicide application, but a few weeds such as quackgrass (*Agropyron repens*) (chiendent) and yellow nutsedge (*Cyperus esculentus* (souchet comestible) are more difficult to control. The application of host-specific pathogens could be integrated into the present weed control system to control these types of weeds.

*Aquatic Weed Control*

Biocontrol of water weeds is being investigated in Florida and other parts of the U.S. The possibilities of using insects, plant pathogens, and a fish, the white amur (*Ctenopharynogondon idella*) are being studied. Water weeds are also a serious problem in many areas of Canada and the developments in biocontrol are being carefully observed.

The disadvantages of using herbicides in water systems are numerous and alternative methods should receive high priority. There is considerable controversy concerning the use of the fish for biological control. Research is continuing and further studies should demonstrate that the advantages will by far outweigh any possible disadvantages.

**Biological Weed Control Program at Macdonald College**

The research in biological weed control at Macdonald College is composed of two segments:

1. The release of screened biotic agents on infestations of weeds in Quebec;
2. Investigation of the potential of native natural enemies of certain weeds in Quebec.

A. Release of Biotic Agents

Insects that have been screened and are available for release are shipped to Macdonald College from the Regina laboratory. These insects are then taken to desirable field release sites and liberated on the target weed. This program has involved the co-operation of numerous Quebec farmers, and its continued success depends on their support. Last year, insects were released on the following weeds in Quebec:

| | |
|---|---|
| Canada thistle (chardon des champs) (*Cirsium arvense*) | — *Urophora cardui* (stem gall fly) |
| Bull thistle (chardon vulgaire) (*Cirsium vulgare*) | — *Urophora stylata* (seed-head fly) |
| Leafy spurge (euphorbe ésule) (*Euphorbia esula*) | — *Hyles euphorbiae* (defoliating moth) |

Additional releases of these insects will be made this year and releases of *Chrysolina* beetles on St. Johnswort, *Tyria jacobeae* (cinnabar moth) on tansy ragwort and *Urophora* spp. on spotted knapweed infestations in Quebec are planned for this year.

*Urophora cardui* has previously been released at St. Hyacinthe and *Rhinocyllus conicus* has previously been established on nodding thistle in the Lac St. Jean region.

B. Native Natural Enemies

This program involves surveying of weed populations, collection of natural enemies (plant pathogens and insects) and determination of the potential of selected organisms as biocontrol agents. At present, two post-graduate students, Jean-Guy Champagne and Harry Hartmann, are investigating the host-parasite relationships of Canada thistle and its rust pathogen and ragweed and its natural enemies. In addition, endemic plant pathogens of other weeds, such as quackgrass and yellow nutsedge, are also being collected and studied.

**Summary**

Biological weed control has recently received renewed interest because it is an environmentally compatible method of weed control without residue and pollution problems. However, biological weed control has its weaknesses and is not suitable for all weed problems. Indeed, only a few of our many noxious weeds have been investigated for biocontrol and so far only two are sufficiently advanced to be considered complete successes. Undoubtedly, with continued interest and research support, the general assumption that biological weed control is used only as a last resort where chemical and other methods have failed will be proven incorrect.

# SOIL compaction

Professor Ted McKyes and Dr. Vijaya Raghavan in the Department of Agricultural Engineering have been conducting studies under a research contract with the Engineering Research Services of Agriculture Canada and a Provincial Agricultural Research grant on the effects of farm machinery on the soils of eastern Canada. On behalf of the Journal, Mr. Rudi Dallenbach, Director of the Macdonald College Farm, discussed the problems of soil compaction — and how to avoid them — with Professor McKyes.

**Rudi Dallenbach:** I have been farming for some 30 years and it seems to me that every five or 10 years concern is expressed about soil compaction. Is there cause for concern?

**Professor McKyes:** Yes, there certainly is. When farmers first told us that they were concerned about soil compaction we decided we had to prove whether there was really any economic problem or not. I think that after three years of work our experiments last summer finally did show that there can be a large effect on the amount of crop you do get off the field because of soil compaction.

To begin with, however, we did not know nearly enough about the mechanics of soil compaction, even though we have volumes of research work by engineers in our library. Some people talked about compaction and some people discussed the effects of the machines, the effects of the water content of the soil, or the effects of the pressure on the soil, but very few people showed that the density of the soil would change the yield of the crops. Other people did experiments showing that roots had trouble getting through hard soil, but no one ever showed how much this reduces the percentage of the crop. There was one good study done in New Brunswick by Saini and Lantagne, in which they measured potato crop losses due to vehicle traffic over the field, but there was not a full study that said a certain machine causes a certain density change in the soil and therefore it causes a certain reduction in the amount of crops you will get off the field. The lack of knowledge is the reason why we have spent three years doing research on the compaction of soil by machines, and the effects on soil structure and plant growth.

**Rudi Dallenbach:** What does soil compaction really do?

**Professor McKyes:** Compaction, which is the reduction in the volume of the soil, reduces the speed at which water can go through the soil because the empty spaces are smaller. It doesn't take much compaction in a clay soil, which has clods and small cracks in the structure which the water runs through, to close the channels off leaving practically an impermeable soil. This can be seen every time water collects on a roadway or in the ruts where a tractor has passed. The soil gets smeared or compressed — even a little—and the water cannot get through. If it rains heavily one year, plants are in danger of being drowned. We have seen cases where they are drowned or there is a reduction that is not apparent to the eye, particularly in a field that has had the same conditions from year to year. However, it is very apparent when you have two plots side-by-side and one plot is more compacted than the other one which has corn twice as high.

Compaction also makes the soil harder so that the roots have more trouble getting through the soil. In our experimental plots some of the hard soils were loosened up by the roots during their growth season. Root growth is one of the best soil looseners there is, but it takes a lot of work and the plants didn't grow as well as the ones on a plot that had a loose soil to begin with. The plants in this loose soil have roots about four feet deep; the ones in the hard soil have roots about two feet deep, so again there is less nutrient and water uptake capability of the roots.

The third thing is that roots must breathe, and compaction reduces the amount of air that can get to the roots, because with smaller spaces in the soil and a harder time for water to get through, it's also much harder for air to get in. As well, the soil may be so wet that the air doesn't have any place to go. All these factors gradually effect the plants from an extreme of a very loose soil with the proper water and the proper air and, of course, fertilization, which is a separate issue. We have achieved corn yield rates of 45,000 kilograms per hectare in experiments, whereas the average of the province is somewhere around 30 to 35,000 total wet weight. We achieved these yields where there was no compaction at all—we didn't walk on the plot, and we even put down a raccoon trap so animals couldn't walk on it either.

**Rudi Dallenbach:** In practice, what steps would you suggest the farmer take in order to avoid overcompaction of soils?

**Professor McKyes:** There is every degree of compaction from 0 to very heavy, and in between there are effects on the plants to a proportional degree. In order to have the least compaction possible, as we still have to seed and fertilize by tractor, we must reduce the number of times that machinery is driven over the field as much as possible.

**Rudi Dallenbach:** We are using heavier equipment and have changed our cultural system from a rotation system to monoculture. Is this one of the reasons that there is more soil compaction? As I see it, under proper soil conservation and management

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practices, soil compaction should not be that much of a problem, particularly in this part of the country where we have heavy frost, frost heaving, and frost action which might correct some of the compaction.

**Professor McKyes:** Spring and fall ploughing also corrects the compaction fairly well in the top six inches by loosening the soil again. However, our rather intensive weeded cultures require a lot of traffic for seed bed preparations, seeding, applying of herbicides, fertilizer, etc., and it turns out that we run over the field from five to 10 times every year with a tractor. The repeated passes pack the ground down a bit more every time and gradually, as the ground becomes more dense, you lose more crop. In our research, which showed the effects of crop yield after tractor traffic, we found that even a small 30-hp tractor driven over the same area 10 times has the same effect on the soil as a 200-hp tractor used once. The use of smaller machines, unfortunately, is not the only answer, and the best answer we could find was to reduce the number of times you can go over the field in a year. We found that the ideal condition of not ever going over the field at all gives beautiful results. We got 40 per cent more corn yield than with a normal traffic pattern on the field. Of course, we know that's impossible because you have to seed, apply fertilizer and herbicide, and prepare the seed bed. But to approach the ideal goal of never driving over the field or even stepping on the field at all would give you quite a bit more money in your crop.

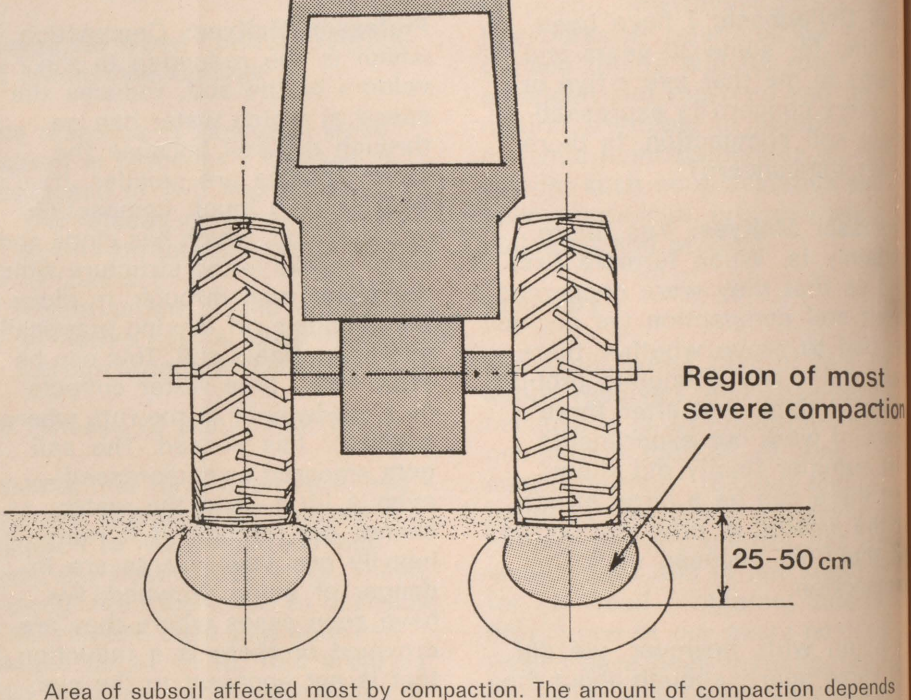
We feel that combined operations should be considered more and more including new machines that can do everything in one pass. That sort of thing could have a big effect.

**Rudi Dallenbach:** Is there an advantage of having a four-wheel drive tractor weighing a certain weight over a two-wheel drive tractor that is double the weight? Quite often you have to have weight in order to have traction. In my opinion, a four-wheel drive tractor can be smaller, it can have more power, and probably reduces soil compaction.

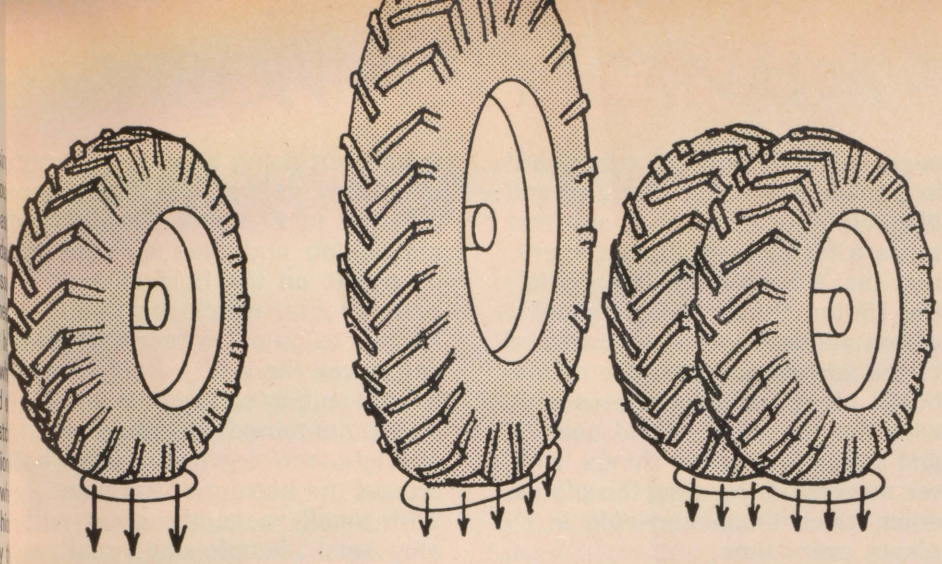
**Professor McKyes:** Yes, a four-wheel drive tractor will help. Not only does it have bigger tires to spread the weight out over the four wheels but also the four-wheel drive slips less because it has better traction and doesn't have to spin the wheels as much to get it. We have found that the slipping of wheels is one of the worst things that can be done to soil structure, especially unstable clay soil. Slipping smears the soil and closes off those small water channels necessary for percolation and aeration, leaving the soil like a brick of cement. One should make sure, even with two-wheel drive tractors, that the wheel weight is enough to prevent too much slip of the drive wheels.

**Rudi Dallenbach:** What about equipment? To me the forage wagon would possibly create the most compaction because it has the heaviest load per tire. Would dual wheels on forage wagons help?

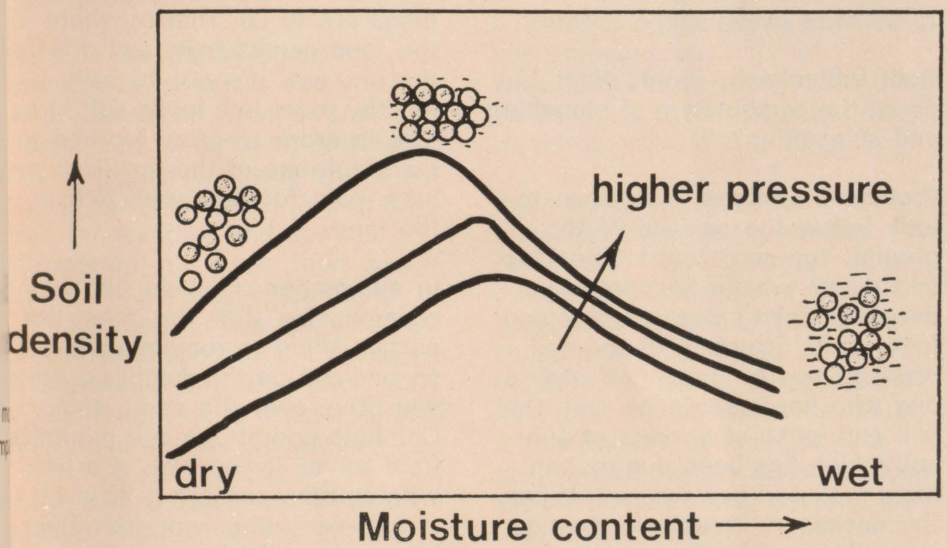
**Professor McKyes:** Increasing the tire area on the wagon would certainly help. Then one pass of the wagon would do less damage because there is less pressure on the ground. Larger wheels, especially, would be a big help. Nowadays we use small wheels to get underneath the bed of a wagon. At the Plowing Match we saw some demonstrations of wagons with very small wheels arranged in a tandem fashion to allow the tires to carry the weight of the forage wagon. Unfortunately, all that some wagon manufacturers do is make sure that the wagon will carry the weight without blowing out the tires. They may not know what high pressure does to the soil. The same thing is true of tractors. We saw small wheel forage wagons get stuck in the field. It took two tractors to pull them out whereas the big wheeled ones would have got out all right. Remember the old hay wagons with the high wheels; the tractors with monstrous steel wheels! We see other cultures, such as in Russia, making very laughable-looking tractors with thin, high wheels on a small tractor. They are not laughable at all — I see them as a good design and I hope we



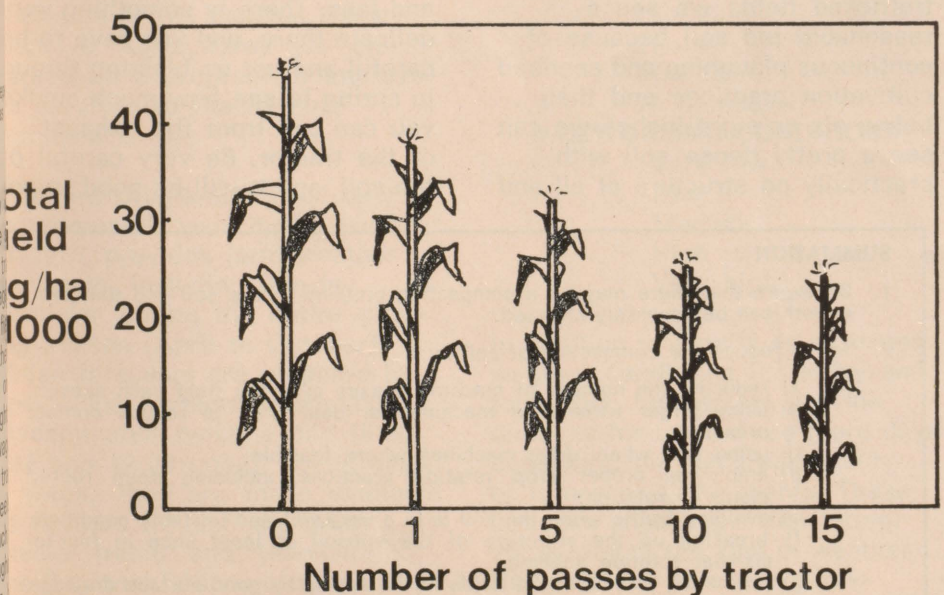

Area of subsoil affected most by compaction. The amount of compaction depends on the tire contact pressure and the moisture content of the soil, as well as the degree of wheelslip.




Higher wheels or dual wheels reduce the contact pressure and soil compaction. The higher tires also reduce wheelslip and rolling resistance.




Compaction can be shown as soil density resulting from different machine contact pressures at different soil moisture contents. Very wet soils do not compact as much, being full of water, but they can suffer severe structural damage.




Soil compaction can lower crop yields considerably. These yield results were measured after different numbers of passes by a 65 hp tractor with a tire contact pressure of 62 kPa (9 psi). Larger tractors would cause even further losses.

have them here, too, instead of trying to have the wide, low look. We don't want tractors to look powerful; we want them to work properly and conserve our soil structure to make it as fertile as possible.

On the whole, manufacturers are trying to provide the best product they can because if they can prove it is the best product it will sell. The soil-saver and other new equipment that is on sale has been by customer demand to do special jobs on the soil. I hope that by preaching the gospel, as it were, we could try to make some changes in the design of tractors. The largest tire, for instance, that you can buy for a tractor, including 30,000-pound tractors, is a 38-inch tire. A small 30-hp tractor has a 24- or 28- inch tire but if you multiply the weight by eight times to get the biggest tractor, the tire doesn't even go up in proportion and the weight is going up by three times the size of the tractor. The area of the tire which causes the pressure goes up only as the square of the size of the tractor goes up. You are getting more pressure from the larger tractors than you are from the small ones, and it gets even worse when you can't get a high enough tire. If they could start making some 45-50-inch high tires for larger tractors, it would have a good effect on reducing the pressure of tractors, and the tires would be a lot cheaper, too.

**Rudi Dallenbach:** What soil conservation and management measures can a farmer take?

**Professor McKyes:** Some farmers in Quebec have been doing their own experiments. They have found that planting different cultures in a field will loosen it up even if it's a heavy, sticky clay that's very difficult to loosen by mechanical processes. They are planting alfalfa, Japanese grass, millet — deep-rooted crops which over a period of two to three years will work their way down and make a new structure in the soil several feet deep.

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**Rudi Dallenbach:** I too, would go to more deep-rooted plants — brome grass and alfalfa — and establish a rotation system. What about drainage? In my estimation part of the problem of soil compaction, particularly in clay soils, is excess water at time of cultivation. Clay soils compact a lot less when dry than when they are wet.

**Professor McKyes:** That's true, and they change structure less. Very wet clay will smear and you lose the delicate clod structures, small cracks, and small roots. Unfortunately, drainage is not a panacea. In most cases in clay soils that are too wet in the spring, it is excellent to be able to make the soil conditions right earlier in the year so that you can drive on the field. In the odd case, however, you have to check the soil type carefully. Occasionally drainage has caused the soil to subside by itself and former productive vegetable farms have become unproductive because the ground settled and got too hard as a result of subsurface drainage. In general drainage is very good, but each case has to be checked because of the many different soil types.

**Rudi Dallenbach:** Does deep tillage equipment have any advantage over the plough?

**Professor McKyes:** They have some advantages and disadvantages. The soil-saver, which is half-way between a chisel and a plough in that it turns some of the soil over, was designed for dry areas in the United States where the complete turning over of vegetation by a plough would have caused great losses due to wind erosion. We do have considerable soil losses in Quebec—something like a million yards a year — but it's mostly due to water erosion. The idea of a chisel, which just turns a little bit of the soil over and does a good job loosening up the soil structure, is appealing because it takes less energy to run the machine, you can go faster, less work has to be done on the soil, and you don't have to go through laborious processes of turning the soil over every year. Millions of cubic yards in Canada are being lifted up and plopped done every year and that takes a lot of work. But in every test that's been done in Ontario, the United States, and England where yields have been compared to the soil preparation, the mouldboard plough always comes out with the top yield. Weed control, and a couple of other things, which we may not know that the plough does, gives the best yields in plants every time.

**Rudi Dallenbach:** I agree with this because I always return to the plough.

**Professor McKyes:** It doesn't have to be done every single season.

**Rudi Dallenbach:** Right. What about the combination of ploughing and sub-soiling?

**Professor McKyes:** You have to look below the surface of the ground. You can't just look on top and guess what's happening underneath. Take probe samples and look at the structure of the soil down to two or three feet. Any one who has experience with the soil and looks at a piece of subsoil which has been dug up can look, feel, and see whether it has the necessary structure, the necessary permeability and the necessary air spaces it needs for good fertility. Often on heavily trafficked fields we see a reasonable top soil because of continuous ploughing and seedbed cultivation practices and then below six or eight inches we can see a pretty dense soil with practically no structure at all and that is not going to allow the roots to go any deeper. An experiment recently in Alabama showed that sub-soiling and then subsequently no traffic on the field allowed cotton roots, which are deep rooted, to go down four feet deep and cover the entire field whereas no sub-soiling and regular tractor traffic contained the roots within an eight-inch depth in a little ball around the bottom of the plant. With small roots, the plant will stay small. People don't realize how big the roots are in their plants and what reflection this is of soil structure.

A plant's roots are as important to it as our stomachs and our lungs are to us. That is where all the food comes from and a lot of the air, too. It's got to have healthy roots in a loose soil structure in order to grow big and to make full use of the fertilizer you have paid for and applied to the land.

In summation, I would like to reemphasize that the most important thing to remember is to try and reduce the number of times you drive over the same spot. Combine operations and minimize field travel. If you look at a field with caution and are a little bit afraid every time you drive over it because you feel you are compacting the soil, then this attitude will cause you to drive over it less and less. There is something very delicate there, and you have to be careful and not go blasting through in spring to see how much smoke you can get from the exhaust of the tractor. Be very careful of the soil, and it will be good to you.

**SUMMATION**

1. Be aware that there may be a compaction problem in the soil and that crop growth can be adversely affected.
2. Try to reduce the compaction of soil by:
   a) reducing the number of machine passes over the field each season;
   b) using larger wheels on machines or dual tires to reduce contact pressure;
   c) using four wheel drive machines where feasible;
   d) employing proper crop rotation practices, including deep rooted plants in rotation;
   e) avoiding traffic when the soil is in a very wet and unstable condition;
   f) breaking up the structure of the subsoil at least once in four-to-six-year rotation scheme;
   g) promoting fast drying of fields in the spring by good surface drainage and avoiding manure and straw applications during the winter;
   h) good subsurface drainage where it is recommended.

# ENVIRONMENT CANADA

# SERVING THE FARMING COMMUNITY

World food crisis in the past few years has brought about a more acute awareness of the need to maximize food production in every part of the world. The crisis may not be as apparent in the industrialized nations, such as Canada, as in the Third World; nevertheless the increased cost of food production, the limits of agricultural expansion, and the shortage of arable land are undeniable facts of today's situation in agriculture.

There is no doubt about the dependence of nearly every facet of agriculture on weather and climate and, in order to enhance farming operations and maximize food production, there is a great need for weather and climatic information by most food producers. In particular, there is a strong requirement for weather forecasts tailored to the needs of farmers as well as summaries of past and present meteorological and climatological conditions.

Conscious of these facts, the Quebec Forecast Office of the Atmospheric Environment Service (i.e., the Canadian Meteorological Service), with the full cooperation of the Quebec Department of Agriculture, has embarked on a program to improve its services to the farming community.

This new program, started on a experimental basis in the summer of 1973, provides farm weather forecasts, including five-day outlooks, during the entire growing season (April to October). These forecasts are prepared by operational meteorologists and disseminated twice a day (6:30 AM and 12:00 noon), seven days a week. They are made available to farmers through the news media (radio and television), the Regional Offices of the Quebec Agriculture Department, and through AES's own Weather Presentation Offices at Dorval, Mirabel, St-Hubert, Sherbrooke, Trois-Rivières, Quebec City, and Ottawa.

The "Farm Weather Bulletin" (i.e., the Farm Weather Forecast) gives a description of the current weather pattern and a forecast of the associated weather conditions to be expected during the next 48 hours, with particular reference to weather parameters which effect farming activities such as daytime drying conditions, percentage probability of rain with possible amounts, more detail on winds, the risk of frost, of thunderstorms, etc.

Daytime drying conditions are indicated by a single number called the "Drying Index". It indicates the capacity of the air to absorb moisture, taking into account the combined effects of wind, sunshine, temperatures, humidity, and rainfall. The usual interpretation of this number is given below; however, through experience, one may develop his own interpretation.

| DRYING INDEX | DAILY DRYING CONDITIONS |
|---|---|
| 0 - 10 | Very low |
| 11 - 20 | Low |
| 21 - 40 | Medium |
| 41 - 70 | High |
| 70 or above | Very high |

In addition to details on expected weather conditions for today and tomorrow, forecasters provide outlooks for up to three more days depending on the predictability of future weather events. These outlooks should give the farmer some idea of the kind of weather that is likely to occur a few days hence; thus he can be forewarned of dry spells, good harvest weather, and so on.

Since most outdoor farming operations are extremely susceptible to rain, it was felt that the introduction of forecast probabilities of precipitation could be of benefit to farmers in helping them to weigh the economic advantages of proceeding with or delaying any given operation, such as haying, harvesting, spraying, etc. Using data from a dense network of weather observations in the farming areas of southwestern Quebec, mathematical equations were developed to calculate these probabilities of precipitation based on the forecast conditions of the atmosphere. The technique has shown considerable success and verifies well enough to be of some value. The proper interpretation of these probabilities will give a degree of certainty or the likelihood of rain occurring at any point (i.e., on any farm) in the forecast area, during the forecast period.

The same observation network has also supplied the data necessary to record accumulation of heat units and precipitation at different stations during the growing season. While heat units are used extensively as indicators of plant growth, the relationship of rainfall to evaporation can be used to assess the moisture available to the plant and the need for irrigation or drainage.

The Quebec Department of Agriculture, in its fight against insect pests and plant diseases, uses weather data to advise farmers on crop protection. The relationship of plant disease and insect development to cumulated heat units and moisture will determine the best time to spray in different regions. Hence the

(Continued on page 20)

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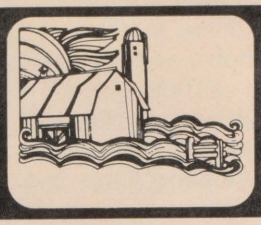
# The Family Farm



Published in the interests of the farmers of the province by the Quebec Department of Agriculture.

## THE AGRICULTURAL RESEARCH COUNCIL CELEBRATES ITS 30TH ANNIVERSARY

**by Bertrand Forest and J. B. Roy, Agronomes**

The Agricultural Research Council was founded on June 6, 1947. This year then marks its 30th year of operation — a sufficiently long period for an appraisal of its achievements and influence on agriculture in Quebec.

This occasion is coupled with an increased interest for research on the part of progressive farmers. It is also coincidental that this body was formed on the very year that the farming profession had chosen research as the general theme of its convention at Rimouski.

In their sessions, the agronomes rightfully recognized the scientist's often ill-known and undervalued work; through its Research Council, the Department of Agriculture increased the prestige of researchers by providing them with an organization whose purpose has been to stimulate and co-ordinate research in Quebec.

**Precarious situation prior to 1947**

In 1936, as a first attempt to systematize research in the province, a few scientists formed an Agricultural Research Committee which, unfortunately, survived only three years. Despite the insufficient means then available, it carried out some excellent work. However, it was too short-lived to allow the implementation of programs which would meet the agricultural needs of the time. It was, therefore, unable to exercise a predominant influence on the direction of agricultural research.

Once this glimmer of hope was extinguished, public indifference again forced researchers into obscurity. But in 1947 agronomes were called to arms. Meeting at a convention, they outlined the state of agricultural research in our province. The papers presented at these sessions indicate that up to that time research in this field had been greatly neglected and that the number of researchers then at work was negligible. Research was not organized and our French schools of agriculture hardly took part in it. Government funds for research in Quebec were at a minimum and, despite some real efforts, the actual participation of the Federal Department of Agriculture appeared quite clearly to be less than that for the other provinces.

"Our poor performance is there for all to see," declared one of the speakers in a retrospective outline of agricultural research in Quebec presented at the Rimouski convention. He added: "We are forced to conclude that with the exception of plant parasitology, our agricultural research is still in the formative stages. If to this we add inadequate research funds, a total lack of organization and ridiculously low salaries for researchers we have a fair idea of our scope in this field."

This is how agricultural research was regarded in 1947. Only an estimated 50 French-speaking scientists devoted part or all of their time to agricultural research in the province. At that time, out of some 400 agronomes with the Department of Agriculture, only a half dozen at most succeeded with difficulty or on the side, in carrying out some minor research work.

It is evident, then, that at the time of the Rimouski conference, the need, value, and implications of research were neither understood now avowed. The milieu was not receptive to scientific work, money was lacking and only a determined few persisted in trying to rouse the public from general apathy, and governments from indifference with regards to research.

Determination, money, and favourable conditions are not enough to carry out a research program. A strong, central body is also needed for support, direction co-ordination, and incentive and

is, precisely, was to be the le of the Research Council. fter seven unfruitful years, the efunct Research Committee, hich had given rise to more hope an action, was replaced by just uch a body.

**ounding and development f the Research Council**

June, 1947, the Department of griculture set up the Quebec gricultural Research Council onsisting of the six following gronomes, chosen for their ompetence in various major gricultural areas: Georges aheux, Chairman; Georges authier, Secretary; J.-Antonio e-Marie, Joseph-E. Chevrette, enri-Louis Bérard, and Joseph-O. andal, members. Referring to s founding, the chairman stated: The Council may very well not ke shape according to plans eretofore entertained. What is nportant is that it exists and has ready begun to show that it tends to survive. Improvements d changes to the initial set up ill be made in due time, if they e deemed necessary."

e main concern of its founders, l of them anxious that the ouncil's work be fruitful, eneficial, and lasting, was to ake it a body which would direct d co-ordinate the work, introduce eas, and arouse interest and ncern. The Council's aim, then, as to promote, orientate, and -ordinate agricultural research Quebec, encourage research ojects, and the formation of ientists and specialists by aking scholarships available.

The Department allocated a sum of $7,000 out of the 1947-48 budget of the Research and Information Service. At its first meeting, on June 16, 1947, the Council made grants totalling $2,700 towards eight research projects, seven of which were submitted by the same agronome. At its second meeting on July 8, 1947, Laurent Barré, Minister of Agriculture at the time, reminded members of the importance of choosing the most urgent problems for study and warned them against starting research in all areas all at the same time.

The Council began thus to take stock of the problems, needs, and available resources and on January 19, 1948, it submitted a report on agricultural research department authorities. The Minister and Deputy Minister agreed that research work was urgent in several agricultural disciplines but they felt that the initial phase should be modest. In 1948-49, however, $110,000 were allocated to the Council. Unfortunately, during this second year, only $13,500 could be used for such purpose owing to a scarcity of researchers.

The Council was first re-organized in June 1951 to include a representative from the Oka Agricultural Institute and one from Macdonald College. On November 26, 1962, it was restructured once again upon the closing of the Oka Agricultural Institute and the transfer of the Faculty of Agriculture of Laval University from La Pocatiere to the campus at Ste-Foy.

Under the terms of the statutes drawn up at the time, the work and responsibilities of the Council in its 15th year were as follows:

— to study research needs and propose a line of action;
— organize meetings with representatives from universities, the Research Branch of the federal Department of Agriculture and all other research bodies;
— evaluate and approve all agricultural research projects sponsored by the Quebec government;
— upon proper study, allocate research grants and funds to universities and agricultural institutes of technology;
— after due consideration, approve scholarship applications and make payment thereof;
— to appoint advisory committees and call upon specialists for specific studies;
— to prepare and regularly update an inventory of agricultural research in Quebec and to publish the results of government-subsidized projects;
— to submit annually an estimated budget to the Minister of Agriculture and to administer the credits voted by the Legislature for the benefit of the Council.

To date, three factors have enabled the Council to carry out its work, namely a simple and flexible organization, an atmosphere of co-operation and continuity, and close ties with the scientific and agricultural sectors.

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**The Council's Accomplishments**

Carefully and judiciously founded and directed, the Council has developed in a climate of understanding and enthusiasm. It is arousing interest in agricultural research, encouraging co-operation from organizations interested in this field of endeavour, and is obtaining the active participation of research specialists

In 1963, it was entrusted with studying "the existing situation and conditions for progressive expansion of agricultural research in Quebec." In its summary report, it revealed that 418 research projects were carried out in Quebec that year. These projects involving universities, the government of Quebec, and the federal government covered eight disciplines: plant science, animal science, soils, entomology, food science, rural economy, agricultural engineering, and beekeeping. Through its financial support, the Council, since its founding, had enabled 185 projects to be carried out. Of these, 66 were still in progress in 1963. Up to that year, it had awarded 195 scholarships, 65 of which were to university students.

From 1947-1972, the Council's accomplishments increased significantly owing to grants which supported hundreds of agricultural research projects. Through its scholarships for advanced studies, it was also instrumental in the formation of scientists who occupied or are still occupying key posts in research, educational and other circles in Quebec, Canada, and abroad.

Each year, the Council publishes a summary of the results from ongoing projects in a brochure entitled "Recherches Agronomiques", in addition to editing a number of press releases, reports and special publications. Theses researched by its scholarship holders provide valuable and interesting resource material. The Research Council has played a major role in the creation of the Quebec Plant Productions Council and the Quebec Livestock Productions Council. These two bodies work closely with the Agricultural Research Council to co-ordinate research work efficiently and ensure the publication of results in production guides.

**Budget**

Research work requires money. To a great extent, scientific advancements depend on funds available. The different governments which came to power since the founding of the Council approved an annual increase in the budget for research and encouraged the publication of results obtained. In fact, the Council's budget was increased from $110,000 in 1948-49 to $1,305,205 in 1975-76. Last year the Council provided research grants toward 81 projects carried out in the various universities in the province. It also granted 14 research assistance scholarships of $4,000 each to promising students in a graduate program in agriculture.

Research sponsored by the Council has led to improvements in production techniques for Gruyère, Richelieu and processed "Ile d'Orléans" cheeses. Equally in the food technology sector, it has perfected methods of extracting proteins from legume foliage and of texturization of proteins. In the livestock sector, research on diseases responsible for a high death rate among young animals, e.g. dysentery in calves and piglets is progressing favourably, while findings relating to the control of estrus (ovulation) and to bovine embryo transplants have become common knowledge.

Work on the relation between climatic factors and crop productions is already providing useful information for setting up production zones and determining crop insurance. Finally, work on the use of accounting data in devising management techniques for dairy farming has been highly successful. These are but a few examples of what the research assistance program has accomplished.

# ARM MANURE IS TOO OFTEN LEFT TO WASTE

**Vang Sophasath,**
**gronome**

arm manure is made up of varying roportions of excreta (urine and sces) from farm animals and imal bedding. Its quality depends n care and preservation. This ticle aims at showing how nportant manure is for improving e structure of the soil and newing it with fertilizing ements and microorganisms.

**. The Importance of Farm Manure**

Manure introduces or restores to the soil some of the nutritive elements which have been absorbed by plants and animals. These nutritive elements are often in an "available" or water-soluble form: 50% N (nitrogen), 20% $P_2O_5$ (phosphoric acid) and 60% $K_2O$ (potash).

Manure adds many **oligo-elements** or "trace" elements such as Fe (iron), Cu (copper), Mn (manganese) etc . . . thereby preventing a deficiency of these substances in the soil.

Manure supplies the soil with organic matter which decomposes to give various acids (organic and inorganic) and carbon dioxide ($CO_2$), all of which help to dissolve the minerals in the soil. This is especially important for phosphorous.

4. The microorganisms, which decompose organic matter, produce vitamins and hormones which stimulate plant growth.

5. Manure improves the structure of the soil by increasing its water-holding capacity. It therefore reduces the compactness of heavy (clay) soils and the water and wind erosion of light (sandy) soils, resulting in improved aeration, easier root penetration, good root formation, better absorption of fertilizing elements and consequent higher yields.

**B. Care and Preservation of Manure**

The quality and quantity of manure is determined by the kind, age, feed, and function of the animal producing it, the type of bedding, and the care taken of the resulting manure.

Manure contains soluble and volatile elements (N-nitrogen). Here are a few suggestions for minimizing losses:

1. Prevent manure leaching by keeping the floor dry and tight.

2. Prevent oxidation of the manure by keeping it in a compact and reasonably moist heap.

3. Use absorbent material such as cut straw, dry sawdust, peat moss etc. to retain all the urine.

4. Use superphosphate preservative which combines with ammonia ($NH_3$) to prevent loss of nitrogen in the air. Superphosphate also acts as a bactericide and as a disinfectant. In general, it is used at a daily rate of one pound per animal (1 pound/au/da).

**C. The Composition of Different Types of Manure:**

The following tables show the value of each kind of manure with respect to the fertilizing elements it contains, depending on its source and on the difference caused by its liquid and solid components. All liquid and solid components should therefore be preserved.

LIBRARY

TABLE 1. COMPOSITION AND FORMULAS OF MANURES

| Type | N Nitrogen | $P_2O_5$ Phosphoric Acid | $K_2O$ Potash |
|---|---|---|---|
| Cow | 0.5%<br>10 lb./T | 0.25%<br>5 lb./T | 0.5%<br>10 lb./T |
| Sheep | 0.9%<br>18 lb./T | 0.34%<br>7 lb./T | 1%<br>20 lb./T |
| Pig | 0.6%<br>12 lb./T | 0.3%<br>6 lb./T | 0.5%<br>10 lb./T |
| Poultry | 1%<br>20 lb./T | 0.80%<br>16 lb./T | 0.4%<br>8 lb./T |
| Horse | 0.7%<br>14 lb./T | 0.2%<br>4 lb./T | 0.7%<br>14 lb./T |

TABLE II. ELEMENTS

| | N Nitrogen | $P_2O_5$ Phosphoric Acid | $K_2O$ Potash |
|---|---|---|---|
| Urine | 50% | 5% | 75% |
| Fesces | 50% | 95% | 25% |

Note: One ton of cow manure corresponds to the **component formula:** 0.5-0.25-0.5, that is, 20 times less concentrated than the chemical formula 10-5-10.

1 ton cow manure: 100 lb. of 10-5-10
1 ton sheep manure: 100 lb. of 20-6-20
1 ton poultry manure: 100 lb. of 20-16-8

### D. Use of Manure

It is used in: truck farming, fertilizing heavy (clay) soils and light (sandy) soils, field crops.

Manure, which is rich in nitrogen, helps to renew the soil after a hay harvest. Applied to grasslands, it ensures long-lasting quality and better yields. In general, the quantity to apply is 8 to 10 tons per acre, depending on the amount of organic matter in the soil.

For grain crops, manure should be used with discretion. During the growing season, when the climate is favourable, too much nitrogen is given off through microbic activity, resulting in the "lodging" of cereal crops. However, if the fertility of the soil is well-balanced (rich in phosphoric acid and in potash), this problem is reduced.

### Conclusion

As manager of an agricultural enterprise, the farmer must, for the sake of good farm economy, strive for optimum yield per acre in order to reduce production costs to a minimum.

# This Month with the QWI

**esignation**

is with deep regret that owing
ill health I have had to submit
the Executive of the Quebec
/omen's Institutes my resignation
om the office of President.

have enjoyed the work im-
ensely: the meetings and
nventions, the visits to counties
nd branches, the day to day
utine of telephone calls and
rrespondence, in particular
elcoming new members to our
rganization. It has been a most
teresting and rewarding
xperience.

would like to take this opportunity
thank the Executive, the Board,
nd all members for their kind-
ess and support at all times.
anks go, too, to the many
anches and members for their
oughtfulness in sending me
ards (there were over 400) and
owers. These plus the visits and
elephone calls have been of
reat comfort and help to me as
try to regain my good health.

ly good wishes go to all the
embers of QWI, an organization
which I hope to remain so that
may continue to do what I can
r "Home and Country."

dna L. Smith

**65th Anniversary Celebration**

**owick** Women's Institute (Cha-
auguay-Huntingdon Co.) cele-
rated their 65th anniversary
long with their monthly meeting
is past November in the United
hurch Hall. There were a few
pecial touches to mark the
ccasion. The program opened with
e Ode and Collect, but the
ianist, Mrs. James Crawford,
dded a livelier version of the accompaniment to suit the changing times. The President, Mrs. Robert McFarlane, presided and welcomed 30 members, six honorary or regular members from former days, and one visitor. All were asked to answer the roll call with "My first teacher and the school I attended". The various answers proved very interesting and entertaining. Some members attended schools in the local districts which included the old one-roomers. Other schools mentioned were Hemmingford, Huntingdon, Ormstown, Sherbrooke, Verdun, Montreal, Gaspé, Maxville, Ontario, Saskatchewan, Alberta, Fort Covington, U.S.A., Finland, Holland, and England.

The last part of the meeting was devoted to the 65th anniversary. Mrs. Melville Brown gave a splendid review of the past 65 years. The first meeting was held at the Temperance Hall in Howick on March 13, 1911. Mrs. Muldren, Macdonald College, was present and explained the aims and purpose of the WI.

I had the privilege of scanning the minute books of the past years, and the work is so commendable that I am going to quote in part from the accounts of these former secretaries. At the very first meeting Mrs. Muldren said, "I am glad to be in Howick; I seem to feel at home here for I have met so many who claimed this district as their home. Now, you might wonder what these clubs are for? They are for the improvement of the home, and are non-partisan, non-sectarian." Then from the 25th annual report we read, "The Institutes give women of all classes and sects an opportunity to meet together upon a common ground, and therein lies their strength." From the 31st annual report, 1941-42, during the war years, we find this thought. "The work of the Women's Institute has been a determining factor during recent years in the remoulding of life in Canada, and many changes which the Institutes demanded, and which at first seemed impossible, have come to be realities." In another annual report during the War years, the secretary said, "May I quote, in closing, the following message from Mrs. Harvey Dunham, President of F.W.I.C.? 'Look well to the work that lies nearest, recognize and accept its basic importance, the developing of our future citizens, the creating and maintaining of the highest form of morale, and after this, whatsoever thy hand findeth to do, do it with all thy might'." "From the 40th annual report, I gleaned this sentence. "It is my privilege to present to you this report and I do so with a feeling of gratitude to those women who organized Howick Women's Institute and have supported its aims and objectives so faithfully throughout the years." For the 50th anniversary, the secretary wrote thus. "Our President read a message from Mrs. Ellard, President of Quebec WI. Her wishes were written on a lovely card. 'First, for the Past, may you all have happy memories; second for the Present, may good fortune be with you; and for the Future, may we have peace on earth, and that the next 50 years will be as fruitful and full of good works as the last 50 have been. We have no fear of the future as we go forward in the words of our motto For Home and Country'." I am sure those of us who knew the late Mrs. Ellard think of her in a kindly way.

Well, we must not reminisce too

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Richmond County President, Mrs. W. Parkes (far right) presented Life Memberships to Mrs. Neil Fowler and Mrs. Crystal Beers of the Melbourne Ridge WI. Mrs. Beers also received a 50-year bar. Mrs. George Johnston also received her Life Membership.

long, but the thoughts of many of the ladies that afternoon had reverted to former meetings and former friends. Then Mrs. Bruce Chisholm read the names of all the presidents, secretaries and treasurers. Our attention was drawn to the prettily set table with a golden shade tea cloth, and a square anniversary cake made and decorated by Mrs. Walter Brown in the WI colours. Mrs. J. Roy Younie cut the cake and tea and coffee were poured by Mrs. J.J. Peddie and Mrs. Arthur Kerr. A social half hour was enjoyed and the ladies went home with the feeling that the future for the Howick WI was bright.

Mrs. Edgar Nugent
Howick WI.

**A Year's Review**

I have decided to give a brief summary of what our particular branch, **York** (Gaspé Co.), has done during the year.

We filled 14 Handi Bags and also sent with them 23 pair of socks, five pair of mittens, and two children's sweaters. In May we went out to a local restaurant for dinner after a short meeting.

We donated $10 for prizes at the Elementary School, three individual cups for the Special Classes, a trophy and an individual cup to the Polyvalent School.

We also had a rummage sale in May. The articles not sold were given to the local Sisters to be distributed among the needy families.

Birthday cards were sent to all Senior Citizens as well as Get Well and Sympathy cards to all members of the Parish. Flowers were sent to seriously ill members throughout the year.

July was the month for our Social evening at a summer cottage near the beach. We made a point of inviting all former members, who were home on holidays, to our summer meetings.

One meeting was a "Come as You Are". The hostess telephones the members prior to the meeting and they are expected to come as they are dressed at that particular time.

We are very interested in the County Fair and our children won the cup for the most entries in the Children's Fair.

In October we had our "Potluck Supper". Each member brought a casserole, salad, or dessert, etc. The main course was served before our meeting and the dessert served after the meeting. It seems that all members turned up for this meeting, and we usually try to have our County President at this meeting. We also had a demonstration on "Hair Care" by a local hairdresser at this meeting.

We helped at the local Sunday School Christmas Party by serving supper to the children and entertaining them until "Santa" came. We had a Christmas Party in December instead of our usual meeting with each member inviting a guest. Mr. and Mrs. Santa came and gave out gifts to all and stayed for the entertainment and lunch.

Each member brought a gift for a child in hospital at Christmas

Our branch gave a gift to anyone from the Parish who is hospitalized at Christmas and to recent widowers we gave home cooking and to widows we gave flowers.

Mrs. Kenneth Patterson
Publicity Convener

**The Impossible Pie**

½ cup biscuit mix
½ cup sugar
3 tablespoons butter
4 eggs
2 cups milk
1 teaspoon vanilla
4 ounce can coconut

Preheat oven to 400°F.

Place all ingredients in blender using regular beater (or use regular hand beater). Blend well. Pour into buttered nine-inch pie pan. Pan will be full. Bake at 400°F. for 30 minutes or until browned and set. Allow to cool before serving. It makes its own crust and golden topping.

**utter Tart Slice**

½ cup butter or margarine
2 tablespoons icing sugar
½ cups all purpose flour
½ cups brown sugar
¼ cup butter or margarine
2 eggs beaten
1 tablespoon vinegar
1 teaspoon vanilla
1 cup currants

eheat oven to 350°. Cream utter and icing sugar then blend flour.

ack into nine x nine inch cake an. Bake for 5 minutes.

ombine remaining ingredients nd pour over base. Bake at 50° for 30 or 40 minutes until et.

rs G. F. Knights,
WI Home Economics Convener

**otluck Supper**

embers of **Dewittville** Women's stitute (Chateauguay-Huntingdon ounty) held a potluck supper the new home for Senior itizens, Walshaven, in Ormstown. 'alshaven is an apartment type velling for senior citizens built 1974. About 25 residents ixed amiably with our members nd invited members of Ormstown omen's Institute to enjoy a mpting array of food. A sing-ong and games rounded out a easant evening.

**hat is a Friend?**

hat is a friend? I will tell you. is a person with whom you re to be yourself. Your soul n be naked with him. He seems ask of you to put on nothing, ly to be what you are. He does t want you to be better or orse. When you are with him, u feel as a prisoner feels who s been declared innocent. You not have to be on your guard. u can say what you think, long as it is genuinely you. e understands those contradic-ns in your nature that lead hers to misjudge you. With m you breathe freely. You can ow your little vanities and vies and hates and vicious arks, your meannesses and ab-rdities and in opening them up to him, they are lost, dissolved on the white ocean of his loyalty. He understands. You do not have to be careful. You can abuse him, neglect him, tolerate him. Best of all, you can keep still with him. It makes no matter. He likes you—he is like fire that purges to the bone. He understands. He understands. You can weep with him. Through it all—and underneath—he sees, knows and loves you. A friend? What is a friend? Just one, I repeat, with whom you dare to be yourself. (C.R. Beran).

(Mrs. Alma Jack, Publicity, Valcartier WI, thought the above worth sharing.)

**Dear WI Members,**

We have reached the unpredictable month of March. One day we may have a blizzard, the next a bright sun with a zephyr-like breeze for we are standing on the threshold of another season. We feel sure of it for a lone bird has lit on a bare tree and has filled the garden with a dream of spring. It's an exciting time, the beginnings of so many types of life, especially in rural areas. We must not forget the patron saint of the Irish either. Some localities have Saint Patricks' concerts and dances, and they are well worth patronizing. It is also the time for annual reports and annual meetings in our WI.

**Valcartier** finished 1976 with a Christmas celebration. The convener mentioned a favourable card party, a barbeque and a dance that had been held earlier. To quote Mrs. Jack, "the success of the above mentioned events was due partly to the co-operation of the members, but in a large part to our marvellous community centre."

We have an interesting item from **Hemmingford.** Earlier in the year this branch sent information to a Women's Institute in Queensland, Australia, about their corner of Quebec. A letter of thanks had been received, including an Australian Country-women's Association tea towel in appreciation. Each A.C.W.A. has a different country to learn about every year, and at their annual meeting the information they have gathered is put on display and samples of that country's food served. The correspondent belongs to a very small branch, seven members in their Division of 17 branches. Their climate is hot and their fruits are more tropical than ours: pineapples, bananas, citrus fruits, and pawpaws grow there. They don't have apples but there are some in other parts of Australia. Hemmingford members admired the tea towel which showed the different types of flowers that grow there. The ladies are wondering how to make the best use of this lovely towel. The highlight of the branch meeting was a surprise party with birthday cake for Mrs. E. Petch, who is 90 years old this month.

Mrs. Petch is a charter member of the branch. She seldom misses a meeting and enjoys getting out and attends many functions and card parties. As she says "I might as well do it when I can. One day I won't be able to."

At the **Grenville** meeting suggestions were given on how to improve their meetings. Some were (1) to discuss the month's motto; (2) that the treasurer give a detailed account of all expenditures; (3) the size and amount of lunches be lessened; (4) that more interest be taken in making the list for the WI handicraft booth at the Lachute fair.

There are other interesting notes. The Home Economics convener read an article at the branch

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meeting at **Granby-Hill** advising people to unplug their instamatic television when it is not in use. One member in Shefford County had lost her summer home because she failed to do this.

**Melbourne Ridge** reported that Mrs. Thomas from the cancer society called at the home of Mrs. Neil Fowler to explain that two of their members are very active in the Cancer Society branch in Danville. Then from **Dewittville** we learn that researchers have developed an artificial pancreas for use in treatment of diabetes which would eliminate insulin shots. Five branches reported from Bonaventure County. At **Matapedia,** members with their guests assembled at the Golden Age Club rooms for an evening of entertainment during the holiday season. A bake sale had been held to raise funds. Members at **Black Cape** made plans to buy utensils for serving soup at New Richmond School. **Grand Cascapedia** sent winter clothing to St. John's Mission in Dalhousie. **Port Daniel** ladies decided to purchase a stretcher for the arena. At the meeting of the **Marcil** branch the members gave suggestions on how the $100 that had been voted in the interest of education should be spent.

Many donations were reported — possibly prompted by the Christmas season. **Stanstead North** gave $50 to the Haskell Free Library at the Boundary to be used to purchase large type books for elderly people and **Hatley** subscribed to two magazines for North Hatley School. **Stanbridge** gave $25 to the Dixville Home and gifts to their forgotten patients in the Douglas Hospital. Both **Jerusalem-Bethany** and **Dalesville-Louisa** gave gifts to Rosemere Children's Home. **Fordyce** reports a donation to Cornell Museum in memory of the late Miss Moore who had been a faithful member. **Bury** gave to the Bury Student Loan Fund: $25 as the annual contribution to the fund and $25 as an In Memoriam for the late Mrs. Elsie Morrison. **Kinnear's Mills** to CARE and to the local community hall. Also a prize for most improvement in English in Thetford Mines High School. **East Angus,** a donation to the Heart Fund in memory of a member's husband. Both **East Clifton** and **Canterbury** branches gave to St. Paul's Rest Home in Bury. **Quyon,** a gift of $10 to buy seeds for Africa. **Lennoxville** gave a crate of oranges to Maplemount Home and also voted $25 to St. Paul's Home. **Spooner Pond** reports a donation to the Sherbrooke Hospital.

Four branches from Sherbrooke County reported activities. At **Brompton Road** the program was in charge of Mrs. Don Cullen who pinned up pictures of prominent world figures to identify. Winners were Mrs. Gordon Hatch and Mrs. Kelly Ross. **Milby** held a well-attended Christmas supper and party under the convenership of Mrs. S. Cairns and Mrs. R. Patrick. The young people attended the assembly after supper with a varied program. Mrs. Suitor filled 40 candy bags, which had been donated by the WI members. At **Lennoxville** mention was made of the new international emblem for maple products and the opening of a farm machinery assembly plant at St.Elie. **Belvidere** heard excerpts from the book Leeds and St.Sylvester and from the book review of "The Stacey Letters".

Some of the branches have been favoured with interesting speakers. At Dewittville Mr. Frechette, information officer at CLSC in Huntingdon, gave an informative talk on the services available through this office. At **Marcil,** Mrs. Henry Wright spoke on the Shigawake Boutique for which many of the members do handiwork. Mr. H. Wright related information on Shigawake Agricultural Society in which the people in this area are very interested. At **Melbourne Ridge** the guest speaker, Mrs. Ignatief, talked about life in Rome when she lived there.

Some interesting roll calls were **Dalesville-Louisa:** re-cycle something and bring it to the meeting. **Cleveland:** one of your favourite recipes with a sample of same to be used for lunch. **Fordyce:** bring and describe the flag of another country. Many flags were represented, as well as the world flag of Girl Guides. **Inverness:** suggest something to make the meetings more interesting. **Brompton Road:** give your name and age in French. **Waterloo-Warden:** name a common bird useful to the farmer. **Valcartier:** identify a prominent Canadian from the picture shown. **East Clifton:** give a useful household hint, and we learn that the use of vinegar in various forms proves applicable in cleaning and reviving wood, in removing stains from plastic and clothing, also effective in ironing out creases. **Dunham:** name a Canadian Olympic medalist.

Some mottoes submitted: A new broom sweeps clean, but an old brush knows the corners. Teach the young people how to think not what to think. He who falls in love with himself will have no rivals.

Mrs. Gladys Nugent
QWI Publicity

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(Continued from page 11)

grower can improve his crop quality and yield and at the same time minimize his cost by eliminating unnecessary sprays.

The present program of specialized weather services to agriculture is restricted to the regions where the most important cash crops are grown: southwestern Quebec and the Ottawa Valley, i.e., from Gatineau to Quebec and from the Laurentian escarpment to the Canada-U.S. border. Eventually, however, the Services will be expanded to cover all major agricultural regions of the province.

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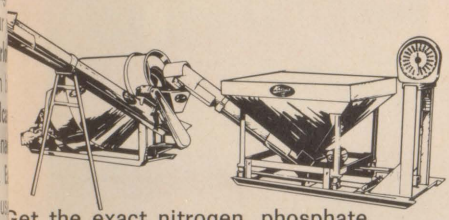

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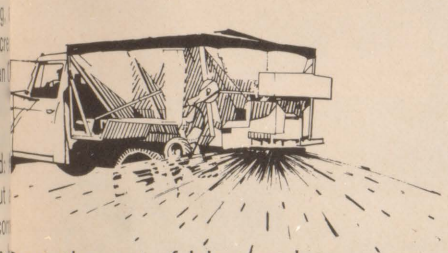

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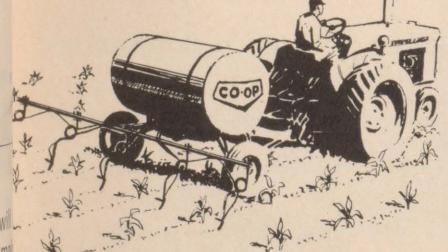

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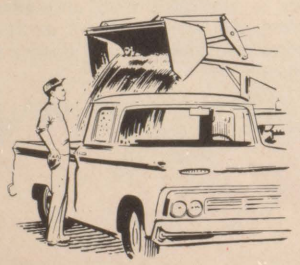

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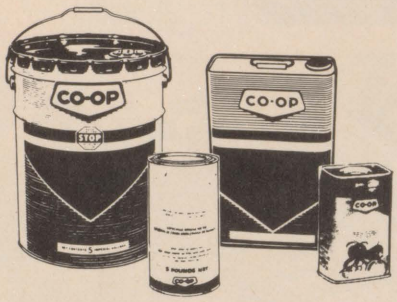

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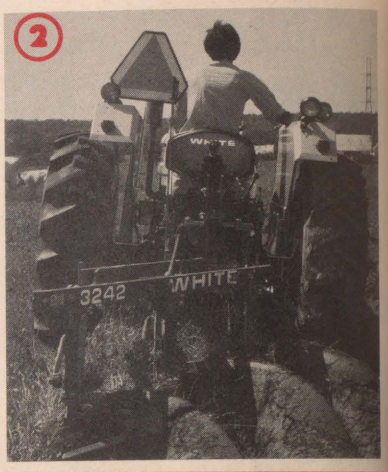



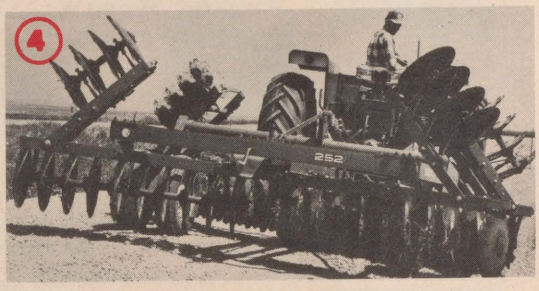


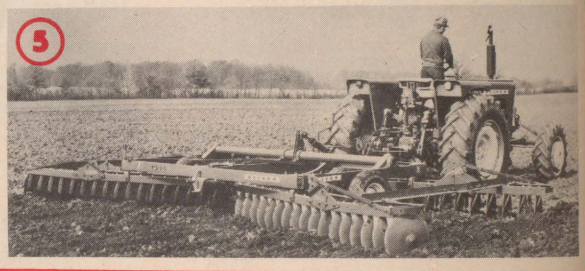


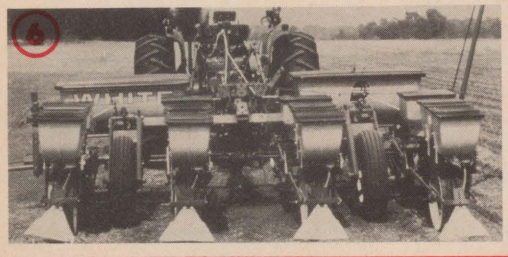


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